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MEMORANDUM

To: Wall Street Development Corp.
From: William J. Scully, P.E.
Corinne Tobias, P.E., PTOE
Date: June 2, 2020
Project Name: Proposed Diamond Hill Estates Residential Development
Project Number: Green No.
Subject: Traffic Assessment Update for Proposed Residential Development

In response to initial comments and requests from the Board and town staff, Green has prepared this traffic assessment update for the proposed Diamond Hill Estates 40B Residential Development project located at Dupee Street off High Plain Street. The development consists of 6 townhouse style duplex units comprising of 12 residential units and developed by Wall Street Development Corp. Access to this proposed site will be provided directly along Dupee Street which will be reconstructed under this development and intersects with High Plain Street to the north. There are several houses that currently exist on Dupee Street and these will remain. Land use within the project area of the development is residential with commercial uses towards the east at Route 1. Since the original memo¹, the site design has been modified including incorporating a hammerhead turnaround, eliminating the circle and making some adjustments to the proposed building locations.

The project location is shown in Figure 1 with respect to the surrounding area. This assessment included:

- A summary of the existing characteristics of the abutting roadway network and site access
- Trip generation projections for the proposed residential development
- Sight distance analysis at the site access driveway location
- Truck turning movement analysis for the Walpole Fire apparatus at the site access



¹ Green International Affiliates, Inc., Memorandum to Wall Street Development Corp., Traffic Assessment for Proposed Residential Development in Walpole, dated February 3, 2020.

EXISTING ROADWAY NETWORK

The assessment focused on the roadway network in the vicinity of the proposed project with an emphasis on the proposed site access driveway locations.

As part of this assessment, a field reconnaissance was conducted to verify the physical and geometric layout of the study area roadways and to observe traffic operations in the study area. A description of the study roadways serving the project site is as follows:

High Plain Street

High Plain Street (Route 27) is functionally classified as a Principal Arterial that is owned and maintained by the Town of Walpole. It is generally oriented in the east-west direction. Throughout the study area, High Plain Street operates as a two-lane, two-way roadway accommodating eastbound and westbound vehicles. It intersects with Route 1 approximately 2,400 feet to the east and also leads to the center of town to the west. The total width of the roadway is approximately 24 feet next to the proposed site driveway. There are shoulders on both sides of the roadway at approximately 1 foot wide. Pedestrian accommodation is provided with a sidewalk along the south side of the roadway. The surrounding land use(s) is primarily residential with some scattered forest land. The speed limit for High Plain Street is 35 MPH.



*High Plain Street at Dupee Street,
looking from west*

Dupee Street

Dupee Street is classified as a local road that is owned and maintained by the Town of Walpole. It that is generally oriented in the north-south direction. Throughout the study area, Dupee Street is a dead-end gravel dirt road that operates as a one-lane roadway accommodating northbound and southbound vehicles. The total width of the existing roadway is approximately 12 feet along where the proposed site driveway is. There are no shoulders or no pedestrian accommodations on this road. The surrounding land use(s) is primarily residential. There is no posted speed limit for Dupee Street.



*Dupee Street looking south from
High Plain Street*

High Plain Street at Dupee Street

High Plain Street and Dupee Street form an unsignalized T-intersection. High Plain Street operates freely as the major East-West leg, while Dupee Street operates as the minor northbound approach operating as a STOP controlled approach. The approaches of this intersection perpendicular to each other and contain flat grades. Pedestrian accommodation is the sidewalk along the south side of High Plain Street that includes a curb ramp at the intersection approach.

PROPOSED PROJECT SITE CHARACTERISTICS

The proposed development consists of 6 townhouse style duplexes that contain a total of 12 housing units. The development is set to be constructed along a repaved/widened Dupee Street, which provides access High Plain Street forming a T-intersection.

Travel Forecasting

In order to estimate the number of trips that could be generated by the proposed development, statistics published by the Institute of Transportation Engineers (ITE) in Trip Generation Manual for similar land uses were examined. Based on a review of the ITE database, Land Use Code (LUC) 210 – Single Family Detached Housing has been selected as the most similar to the project, although with the duplex townhouse type units that will tend to be smaller than the typical single family home, the trip estimates are likely to be somewhat conservative. The total estimated trips generated by the project are presented in Table 1. Detailed trip generation calculations for the proposed development are included in the Appendix.

Table 1 – Summary of Project Trip Generation

Land Use	Weekday AM Peak Hour			Weekday PM Peak Hour			Weekday Daily		
	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
Residential Housing (8 units)	3	10	13	8	5	13	74	74	148

As indicated in Table 2, the proposed project is anticipated to result in a weekday total of approximately 148 net new vehicle trips over the course of a typical weekday with 74 entering trips and 74 exiting trips made in that time. During the weekday morning peak hour, the proposed project is expected to generate approximately 13 net new vehicle-trips with 3 entering trips and 10 exiting trips. During the weekday afternoon peak hour, the proposed project is expected to generate approximately 13 net new vehicle-trips with 8 entering trips and 5 exiting trips. With 10 to 13 peak hour vehicle trips, equating to about only 1 vehicle every 5 to 6 minutes, the additional housing units would be expected to create minimal if any impact to the current traffic operations on the High Street mainline.

SIGHT DISTANCE EVALUATION

Adequate sight distance is an important safety consideration at intersections and driveways. Stopping and intersection sight distances were reviewed at the existing Dupee Street intersection with High Plain Street.

The minimum criteria are defined by the American Association of State and Highway and Transportation Officials (AASHTO)². SSD relates specifically to safety. As indicated by AASHTO, if the available ISD meets or exceeds the minimum SSD criteria, then there is adequate safe sight distance available for motorists to enter/exit safely and avoid collisions. A criterion for calculating minimum required sight distances can be established based on the posted speed limit. It is noted that the posted speed limit for High Plain Street is 35 MPH.

The SSD and ISD were measured in the field at the proposed site driveway and access road and compared to minimum and desirable distances; Table 2 summarize the results of the evaluation.

² American Association of State Highway and Transportation Officials (AASHTO), A Policy on Geometric Design of Highways and Streets, (Green Book) Washington, D.C., 2011.

Table 2 – Summary of Sight Distance Analysis: High Plain Street

COUNTY STREET SITE DRIVEWAY	SIGHT DISTANCE		
	35 MPH		
	MEASURED (FT)	MINIMUM REQUIRED (FT)	DESIRABLE (FT)
High Plain Street Eastbound	825	250	-
High Plain Street Westbound	400	250	-
INTERSECTION SIGHT DISTANCE			
Dupee Street, looking east (High Plain Street WB traffic)	825	250	390
Dupee Street, looking west (High Plain Street EB traffic)	350	250	390

As shown in Table 2, minimum SSD was met and exceeded for 35 mph in both travel directions at the site access intersection. In fact, the available SSD exceeds the distances required for speeds of more than 45 miles per hour. Minimum ISD was also met at the site access intersection as looking east to WB the traffic has 825 feet and 350 feet looking to the west at approaching EB traffic. In both cases, the available ISD meets the SSD for both the posted speed and speeds up to nearly 45 mph. The ISD looking west onto High Plain Street is limited to the 350 feet by the existing High Plain Street roadway curvature.

CONCLUSIONS AND RECOMMENDATIONS

Green conducted an analysis on existing traffic conditions to determine the operations of the proposed residential development of 6 townhouse style duplex units. As part of this traffic assessment,

- Green conducted the trip generation for the proposed residential development of 6 townhouse style duplex units and determined the expected low increases in traffic volumes to be 148 net new vehicles per day.
- Proposed improvements to Dupee Street afford safe access to vehicles.
- Large vehicle (i.e. Walpole fire truck) maneuvering will be able to access Dupee Street and be better accommodated than under current conditions. The hammerhead turnaround has been designed to meet town standards.
- Green also completed sight distance analysis at the proposed site driveway to evaluate the safety for vehicles entering and exiting the proposed project and the results show that safe sight distance criteria will be satisfied.
- It is recommended that when Dupee Street is reconstructed, new ADA compliant ramps at the High Plain Street curb roundings and STOP sign control with a sign and markings be included.

Appendix

Trip Generation Calculations

Fire Truck Turning Movement Analysis

TRIP GENERATION WORKSHEET

LAND USE: *Single Family Detached Housing*
 LAND USE CODE: 210 Independent Variable---Trips per DU
 SETTING/LOCATION: General Urban / Suburban
 JOB: Proposed Diamond Hill Estates, Walpole, MA
 JOB NUMBER: 20001 Number of Units: 12

WEEKDAY

RATES:	Total Trip Ends			Directional Dist.		Number of Studies
	Average	Low	High	Enter	Exit	
DAILY	9.44	4.81	19.39	50%	50%	159
AM PEAK	0.74	0.33	2.27	25%	75%	173
PM PEAK	0.99	0.44	2.98	63%	37%	190
PK GEN AM	0.76	0.36	2.27	26%	74%	157
PK GEN PM	1	0.49	2.98	64%	36%	165

	BY AVERAGE		
	Total	Enter	Exit
DAILY	113	57	57
AM PEAK	9	2	7
PM PEAK	12	8	4
PK GEN AM	9	2	7
PK GEN PM	12	8	4

	BY REGRESSION			R ²
	Total	Enter	Exit	
DAILY	148	74	74	0.95
AM PEAK	13	3	10	0.89
PM PEAK	13	8	5	0.92
PK GEN AM	12	3	9	0.89
PK GEN PM	15	10	5	0.92

SATURDAY

RATES:	Total Trip Ends			Directional Dist.		Number of Studies
	Average	Low	High	Enter	Exit	
DAILY	9.54	5.32	15.25	50%	50%	52
PEAK HR	0.93	0.64	1.75	54%	46%	31

	BY AVERAGE		
	Total	Enter	Exit
DAILY	114	57	57
PEAK HR	11	6	5

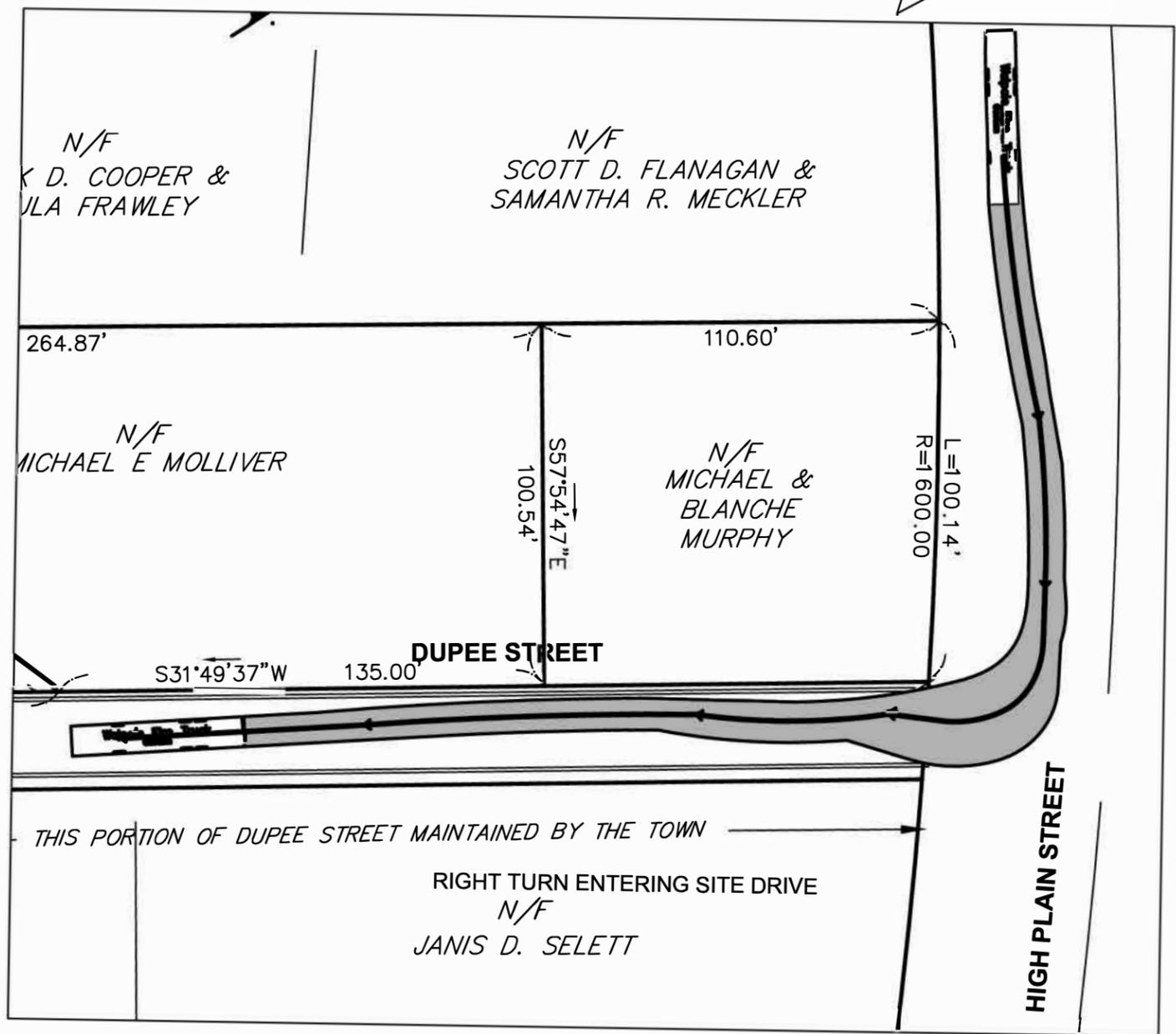
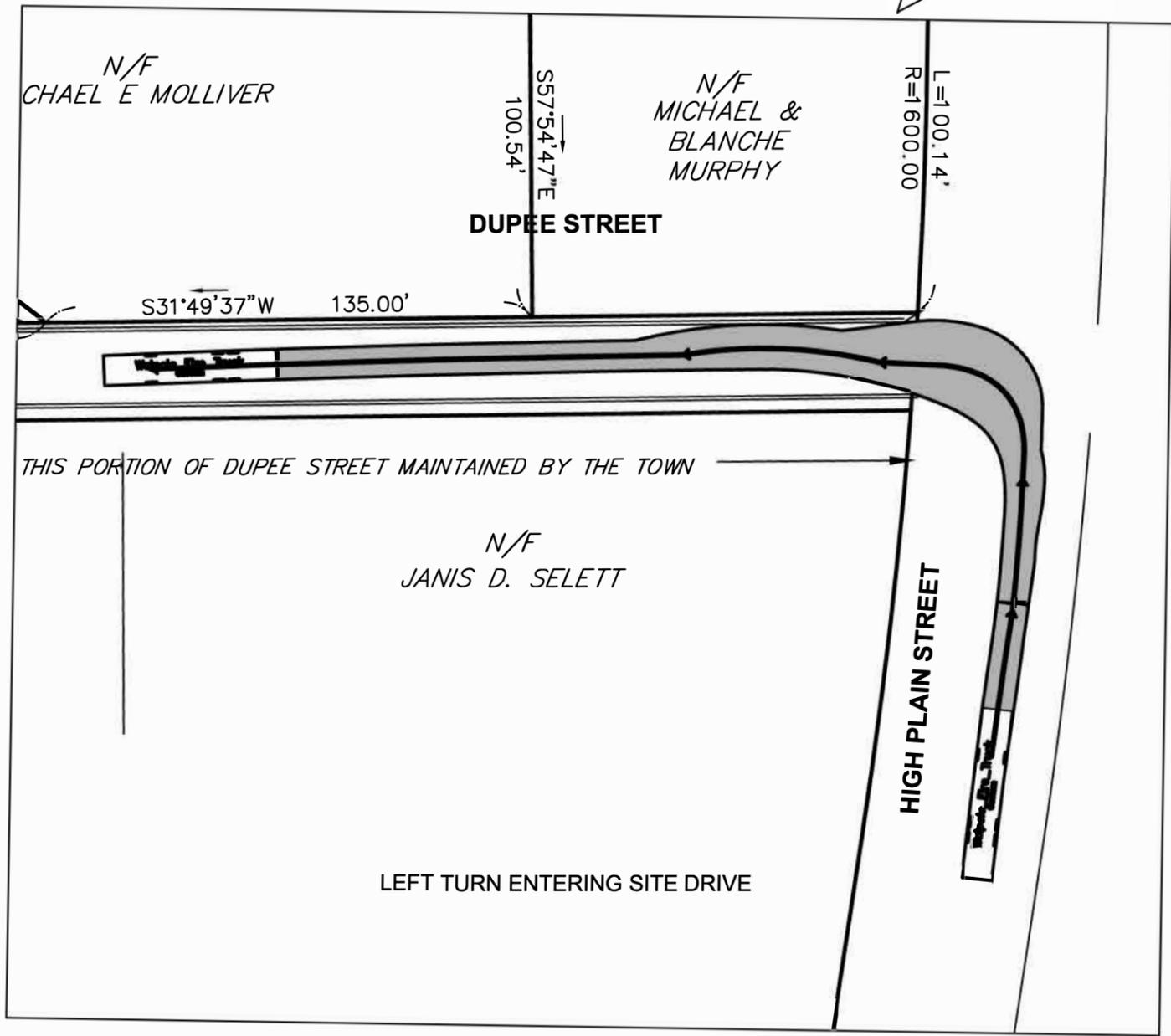
	BY REGRESSION			R ²
	Total	Enter	Exit	
DAILY	134	67	67	0.91
PEAK HR	28	15	13	0.87

SUNDAY

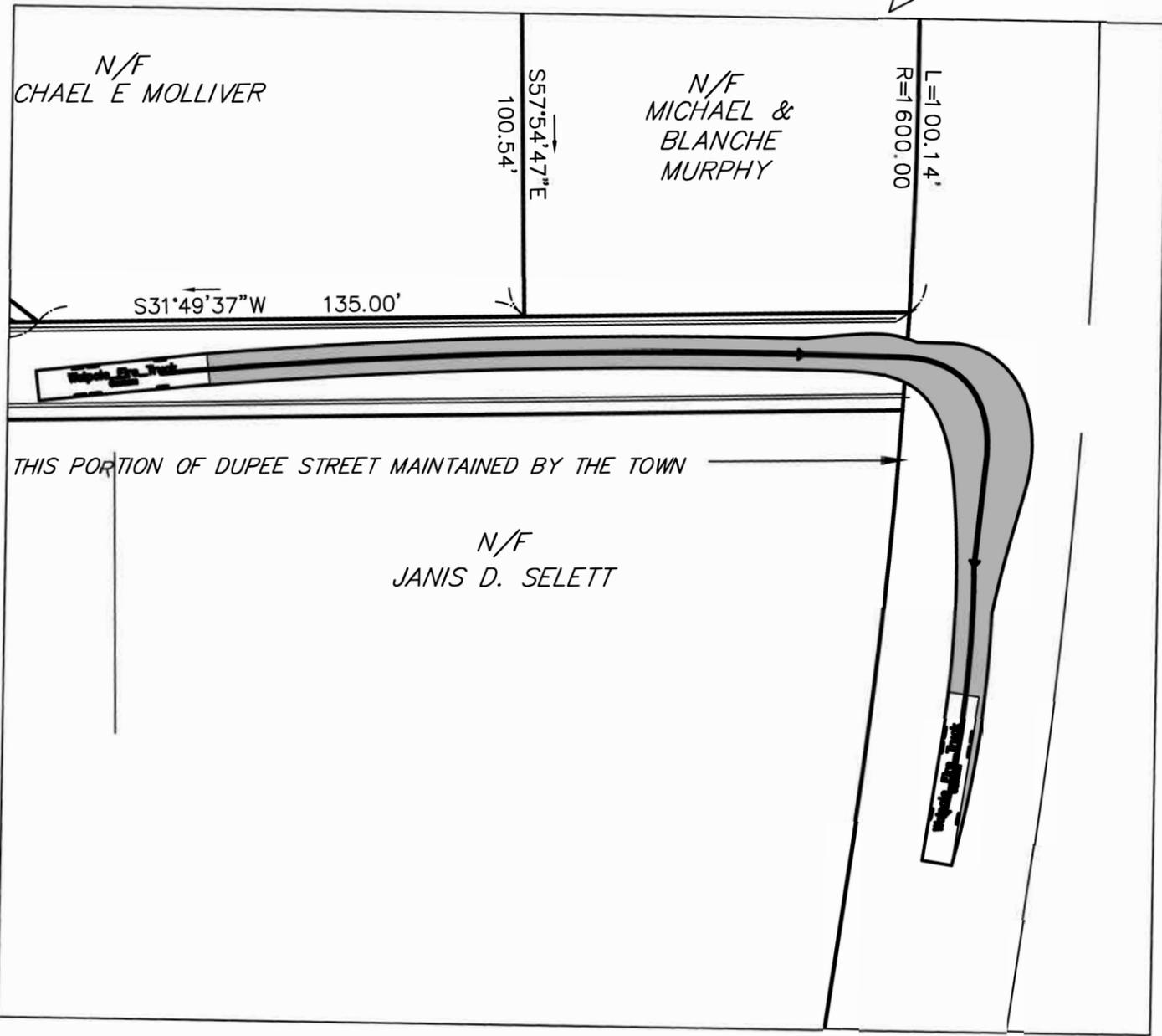
RATES:	Total Trip Ends			Directional Dist.		Number of Studies
	Average	Low	High	Enter	Exit	
DAILY	8.55	4.74	11.82	50%	50%	51
PEAK HR	0.85	0.6	1.45	53%	47%	31

	BY AVERAGE		
	Total	Enter	Exit
DAILY	103	52	52
PEAK HR	10	5	5

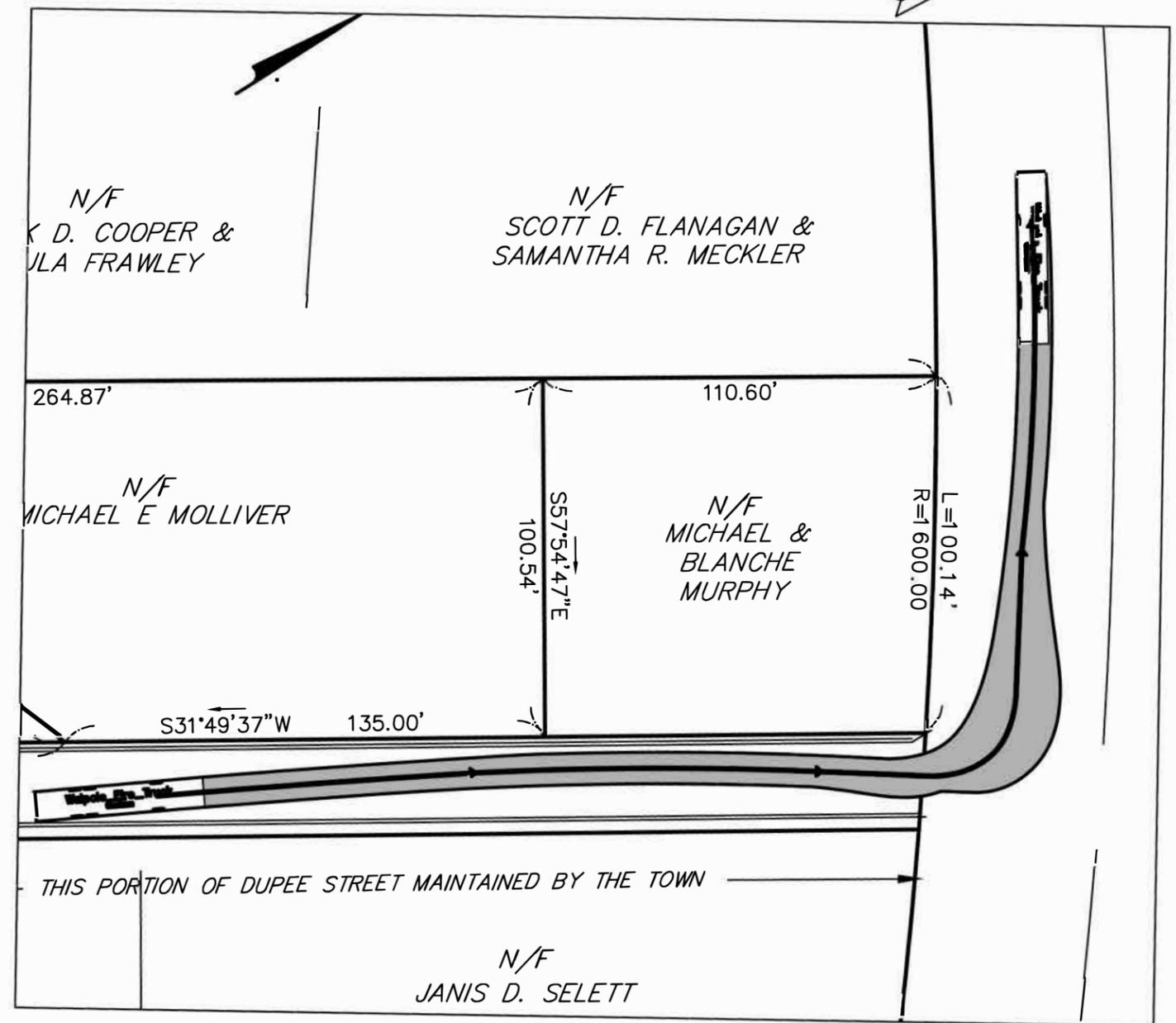
	BY REGRESSION			R ²
	Total	Enter	Exit	
DAILY	41	21	21	0.94
PEAK HR	21	11	10	0.88



PROJECT: PROP DIAMOND HILL ESTATES		
DESIGN SUBMISSION: FIRE TRUCK TURNING MOVEMENTS		
DRAWING TITLE: ENTERING SITE DRIVE		
PREPARED FOR: WALL STREET DEVELOPMENT		
PREPARED BY:  GREEN INTERNATIONAL AFFILIATES, INC. Civil and Structural Engineers (978) 923-0400 Westford, Massachusetts GreenIntl.com		
SCALE: 1" = 20'	DESIGNED BY: DP	SHEET NO. 01 OF 02
DATE: 01/15/2020	DRAWN BY: DP	
PROJECT NO. 19113.001	CHECKED BY: CT	



RIGHT TURN EXITING SITE DRIVE



LEFT TURN EXITING SITE DRIVE

PROJECT:	PROPOSED DIAMOND HILL ESTATES	
DESIGN SUBMISSION:	FIRE TRUCK TURNING MOVEMENTS	
DRAWING TITLE:	EXITING SITE DRIVE	
PREPARED FOR:	WALL STREET DEVELOPMENT CORP	
PREPARED BY:	 GREEN INTERNATIONAL AFFILIATES, INC. Civil and Structural Engineers (978) 923-0400 Westford, Massachusetts GreenIntl.com	
SCALE: 1" = 20'	DESIGNED BY: DP	SHEET NO. 02 OF 02
DATE: 01/15/2020	DRAWN BY: DP	
PROJECT NO. 19113.001	CHECKED BY: CT	